

A SCUTTLE FLY (DIPTERA: PHORIDAE) THAT
 APPEARS TO BE A PARASITOID OF A SNAIL
 (STYLOMMATOPHORA: ZONITIDAE) AND IS ITSELF
 PARASITISED BY A BRACONID(HYMENOPTERA).

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OBSERVATIONS

On 7 June 1980 while collecting snails from Druids Coombe, Somerset (Grid ref. 31/006 378), with a party of colleagues led by Dr. R. A. D. Cameron, I mentioned the possibility of finding shells occupied by the puparia of Sciomyzidae as opposed to snails. I was rewarded by being passed two shells of *Vitraea crystallina* (Müller) collected by John Hall. Both shells contained identical puparia lodged in the last whorl, in an identical orientation (Fig. 1). Unlike the puparium of a Sciomyzid, however, there were conspicuous respiratory horns protruding into the space just inside the aperture of each shall (Fig. 1). The specimens were placed in rearing tubes and subsequently each produced a male Phorid belonging to the species *Megaselia fuscineris* (Wood), the first emerging on 26 June and the second on 29 June 1980.

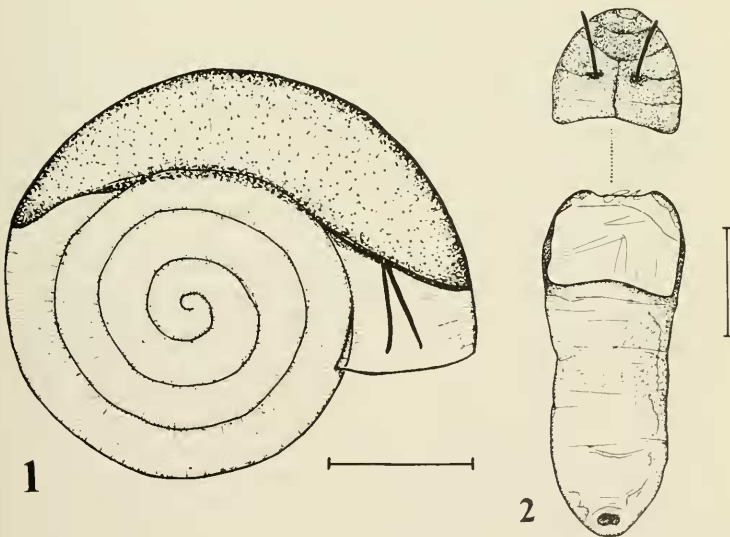


Fig. 1. Puparium of *Megaselia fuscineris* inside shell of *Vitraea crystallina* (scale line = 1 mm).

Fig. 2. Empty puparium of *Megaselia fuscineris*, with detached dorsal plate bearing respiratory horns. (Scale line = 1 mm)

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Further collections of small snails, and their shells, were made on the Malham Tarn Estate, North Yorkshire in July and September 1980 as follows.

In July collections were made for the Westside Wood (Grid ref. 34/8867). The only species of snail shell found to harbour puparia of *M. fuscineris* were *Vitraea crystallina* and *V. contracta* (Westerlund). 21 shells of *V. crystallina* were collected with empty puparia and 8 shells with live puparia. Only 1 shell of *V. contracta* with an empty puparium was collected. All the puparia were identical to those collected in Somerset and were positioned in the same way in the shells (Fig. 1). Of the 8 live puparia 7 were kept alive in rearing tubes and one was preserved. From the 7 puparia 2 females and 1 male *M. fuscineris* were reared. Two of the puparia gave rise to a single Braconid each and two died. The Braconids have been identified by Mr. T. Huddleston (British Museum, Natural History) as *Aspiloba inops* (Foerster). Stelfox and Graham (1950) refer to this species as *Panerema inops* but Fischer (1970) gives *Panerema* as a synonym of *Aspilota*.

In July collections were made from the Tarn Close ungrazed limestone grassland (Grid ref. 34/894 671) and again puparia of *M. fuscineris* were only found in shells of *V. crystallina* and *V. contracta*. Two shells of *V. crystallina* had empty puparia and 1 had a live puparium. One shell of *V. contracta* had a live puparium. A further collection was made on 4 September. One shell of *V. crystallina* had an empty puparium and I had a freshly dead snail along with a larva. The larva was preserved in alcohol and subsequently mounted on a slide in Berlese's Fluid. Although it proved to be the penultimate instar its cephalopharyngeal skeleton showed clear affinities with the remains of this structure in the remnants of the last instar larvae extracted from shells containing puparia of *M. fuscineris* (see below).

All live *Vitraea* snails from Westside Wood and Tarn Close were examined for larvae and then placed in rearing tubes. It was considered unlikely that early larval instars would be easily detected through the shell. It had been the moving black cephalopharyngeal skeleton that revealed the presence of the one larva that was found. It was considered worthwhile, however, to keep shells known to have been harbouring live snails at the time of collection to see if any might subsequently be found to contain detectable larvae or puparia of *M. fuscineris*. This experiment was unsuccessful as the snails died and were found to be infested with nematodes. These occurred in two sizes. The larger measured 1.7 – 2.0 mm in length and 0.1 mm maximum breadth, and had the anterior fifth tapered to a truncated point but the tail end more-or-less rounded. The smaller, presumed juveniles of the larger, measured 1.0 – 1.3 mm x 0.05 mm and had a more pointed tail end. Infestation of a dead *Vitraea* seemed to be initiated by the smaller nematodes and the larger ones only appeared later. By the time the snail was nearly completely consumed large numbers of small ones were observed leaving the shell. The shell with the larva of *M.*

fuscinervis in it also contained a few small nematodes. Shells of *Vitraea* found in the field with some remains of a dead snail still present were mostly infested with both sizes of nematode. In future experiments it will clearly be necessary to isolate individual snails in single tubes and to take precautions to exclude material likely to be contaminated with nematodes.

THE PUPARIUM AND LARVA OF *Megaselia fuscinervis*

The puparium of *M. fuscinervis* is illustrated in Fig. 2. It is unusually thin-walled, apart from the plate which detaches at the time of adult eclosion. This plate is so shaped that it precisely occludes the last whorl of the *Vitraea* shell, like an operculum in a prosobranch mollusc. By being positioned a little way back from the rim of the shell aperture (peristome) the respiratory horns are able to protrude forward while still being within the shell (Fig. 1). The puparium is generally brownish in colour with a dark brown detachable plate and the almost black, more-or-less straight, respiratory horns. The posterior spiracular processes are closer together than is usual in the genus *Megaselia*, and thus avoid any risk of being against the walls of the shell.

At high magnification the puparial integument is seen to be covered in evenly-spaced pointed denticles (resembling the bases of the micro-setae found in some species of *Megaselia*). The whole puparium is boat-like, with the anterior and posterior ends curving dorsally (Fig. 1). In order to prepare this drawing the specimen was slide-mounted in Dimethyl Hydantoin Formaldehyde Resin. This renders the shell more translucent without actually dissolving it. To prepare Fig. 2 a specimen was soaked in Berlese's Fluid to dissolve the shell and the extracted, empty puparium was then mounted on a slide in Berlese's Fluid.

The larva proved to belong to the penultimate instar but was evidently nearing moult, as the mouth hooks of the final instar were already forming above the functioning pair. This makes for a confusing picture. Discernible characteristics include the bifurcation of both the dorsal and ventral wings of cephalopharyngeal skeleton posteriorly and a conspicuous fenestration of the anterior bridge linking the anterior edges of the dorsal wings. The mouth hooks each have a single, down-curved, anterior tooth.

The larva was situated in the shell with its posterior end towards the aperture of the latter and its mouth-hooks probing the remains of the snail. The larval remains in a shell occupied by a puparium are to be found amongst the residue of the snail in the apex of the shell.

DISCUSSION

Megaselia fuscinervis adults have previously been recorded in Britain in the months of April, May, June and July (Wood, 1908, Parmenter, 1965, 1966, Disney, 1978). Otherwise the natural history was unknown. Recently, however, Dr. R. Szadiewski has sent me a specimen he had reared from forest soil in Poland in July 1980.

The observations presented above clearly indicate that *M. fuscinervis* puparia are not uncommon in shells of *Vitraea crystallina* and they also occur in shells of *V. contracta*. The precise positioning of the puparium and its modifications indicate that this is no accidental association. The finding of a larva consuming a snail showing no obvious signs of putrefaction further suggests that *M. fuscinervis* larvae are parasitoids of *Vitraea* snails in a manner reminiscent of Sciomyzid larvae in larger snails (e.g. Berg, 1964). Furthermore the apparently invariable infestation of dead *Vitrea* by nematodes suggests at the least that these nematodes would be likely to demolish dead *Vitraea* before they could be exploited by the larvae of *M. fuscinervis*. Whether these nematodes will actually attack and kill healthy snails is not known.

The parasitisation of *M. fuscinervis* puparia by *Aspilota inops* provides the first host record for this Braconid. Stelfox and Graham (1950) give capture dates for this species in July, August and September.

Acknowledgements

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References

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BLOMER'S RIVULET: DISCOLOXIA BLOMERI CURTIS AT WESTON-SUPER-MARE. — This species was of regular occurrence here prior to the advent of Dutch Elm disease. As I had not noticed it for several years I was pleased to see a fresh specimen in my moth trap on May 20 last, so hope that it is about to revive in numbers again. — C. S. H. BLATHWAYT, Amalfi, 27 South Road, Weston-super-Mare, Somerset. 21.v.1982.